IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	10/642,389
Applicant:	Jay FRALEIGH
Filed:	August 15, 2003
T.C./A.U.:	3644
Examiner:	Susan C. Alimenti
Docket No.:	040292.003
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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R. § 1.132

TO THE HONORABLE COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

DR. TED E. BILDERBACK does hereby declare as follows:

1. I am a professor and Nursery Extension Specialist at North Carolina State University and a member of the Horticultural Science Department since 1977.

2. I earned Bachelor of Science (BS) and Master of Science (MS) degrees in biology and botany from Emporia State University, Emporia, KS. I earned a Doctor of Philosophy (Ph.D) in Horticulture from Kansas State University in 1976.

3. I received the American Association of Nurserymen's Extension Award in 1993, the Southern Nurserymen's Association Porter Henegar Memorial Award for Research in 1995, the Extension Education Award from the North Carolina Cooperative Extension Service in 1995 for my extension education program "Environmentally Compatible Nursery Production Practices". In 1999, I received one of the six Environmental Awards from the Southern Nursery Association in recognition of my contributions as a author for the <u>Best management practices: Guide for producing container-grown plants</u>. Also in 1999 I was awarded the

N.C. State College of Agriculture and Life Sciences Outstanding Extension Service Award and was inducted as a charter member of the NCSU Academy of Outstanding Faculty Engaged in Extension.

4. My research and extension programs have focused on environmentally conscious cultural practices for growing nursery stock with emphasis on container substrates, plant and substrate nutrient levels and irrigation management.

5. The growing of bare-root plants in covered raised beds with drip tape irrigation to hydrate the bare-root plants is known in prior art systems. For example, it is known to plant bare-root strawberry plants, bare-root perennial nursery crops and some bare-root shade tress in raised beds with plastic cover and drip tape to hydrate the plants.

6. However, while bare-root growing of plants in covered raised beds by providing hydrating means to bare-root plants is known, such as shown in U.S. Pat. No. 5,709,049 to Baird, this growing technique is not applicable to container plants. This invention is not directed to bare-root plants, but to container plants. Drip-tape or below-ground irrigation for hydration of a bare-root plant would not be expected to penetrate the container. Accordingly, a plant in a container of the present invention is not hydrated by drip tape or irrigation means in the raised bed.

7. Instead, the present invention delivers fluid, such as by drip tape, to control the temperature in the bed surrounding the container of the plant. Watering of the container plants of the present invention occurs separately in a directed water line, such as a spray stake in each container. The prior art does not suggest a growing method where a container plant is grown in a raised bed and includes both a temperature control line and a watering line. I believe the temperature control

line in conjunction with container plants to moderate root zone temperatures to be a unique feature of this invention over prior growing systems.

8. "Pot in Pot" growing methods, such as disclosed in U.S. Pat. No. 6,223,466 to Billings, and also detailed in my attached publication Pot in Pot, are well-known in prior growing techniques.

9. This invention teaches the use of raised beds in combination with the container plant which acts to eliminate the flow of storm water into containers installed in the raised beds. Pot in Pot and in-ground nursery container production sites often suffer from water logging events. Overflow of surface water into containers installed two to three inches above field grade can saturate potting substrates leading to immediate mortality or slower attrition due to root diseases following saturated root zone conditions. Accordingly prior Pot in Pot systems, such as disclosed by U.S. Pat. No. 6,223,466 to Billings, do not teach or suggest avoiding water logging events in container plants as taught by this invention.

10. Further, the use of a temperature control line in the present invention provides the added advantage of moistening and stabilizing the soil in the covered raised bed. The moist soil stabilization resists erosion and gullies that could result if a Pot in Pot or in-ground container were simply situated in a bed, including by attempting to combine the teachings of raised beds taught in bare-root systems with the growth of container plants.

11. Pot in Pot nurseries also are usually covered with a layer of 4 or 6 mil plastic overlaid with ground cloth to direct surface rainfall away from containers and not allow water to penetrate the to the growing bed. In embodiments of the invention that include a permeable bed cover, rainfall beneficially penetrates the soil and resists the run off issues associated with storm water movement from non-pervious nursery container growing beds. Also, many in-ground production sites

where containers are installed directly into bare field soil face erosion problems. The covering of the raised bed of this invention thus acts to also prevent the erosion of soil of the container plant growing beds.

12. Accordingly, my review suggests that this invention provides innovative and major advantages for storm water management, water conservation, resisting soil erosion and moderating root zone temperatures in container plants.

13. I further declare that all statements made herein of my own knowledge, are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both under § 1001 of Title 18 of the United States Code and the such willful, false statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully submitted,

Dr. Ted Bilderback

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NC STATE UNIVERSITY

APOT IN POT@

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APot in Pot@ container production is a combination of field growing and container production. This production technique utilizes two containers with a ?Socket@ container placed in the ground and a second pot containing a plant is placed in the first pot. When the first pot is ready to be sold it is lifted out of the socket pot. Container sizes from #2 to # 25 have been used in the P in P system. Smaller containers may be placed lip to lip while minimum spacing of 15 gallon containers seems to be 4 feet between rows and 4 feet between containers. Spacing is wider for 25 gallon and larger containers. Rows can be offset for a diagonal alignment to provide some additional maneuverability. Two container supply companies Lerio and Nursery Supplies developed 15 and 25 gallon containers which were designed to seat tightly at the top but retain a 2 to 2.5 inch air pocket between the bottom of the two containers. Nursery Supplies bought Lerio so P n P containers in the future may only be available from one company.

Immediately recognized advantages of APot in Pot@ production are that (1) the thermal heat load of above ground containers which can exceed 140^{o} in the sun is avoided, (2) trees with big canopies don=t blow over and (3) the production technique is also an over-wintering technique to avoid frozen roots.

Installing ?Pot in Pot ? production systems usually includes installing drainage lines under the socket pot unless the field has very sandy, extremely well drained soils with no shallow water table. Without drains, heavy rains may flood the containers and even wash containers out of the ground. If actively growing plants are flooded for more than 24 hours, root damage, disease and loss of plants can be expected. To avoid flooding, drain tile should be installed in the row approximately 6 to 10 inches below the bottom of the socket container. Four inch corrugated drain tile is usually used for drainage. Some growers install four inch perforated tile covered by a filter fabric and gravel below the row of containers. However the gravel layer may become clogged with sediment over time. Therefore,other growers have additionally cut six inch sections of drain tile and placed them beneath containers filled with gravel to serve as a

drainage collar between the socket pot and the drain line. One grower installed non-perforated tile and connected the bottom socket pot to the tile using a beveled (diagonally sliced) piece of 1 inch pvc pipe to create a direct connect from the center of the socket pot to the drain tile.

Drain lines should slope to one end of the field so that they carry water from the P in P growing area. The ends of the drain lines can be connected to a header or manifold that carries drainage to a detention basin or the ends can be left open and drained across a grass filter strip if the flow is designed to spread out and not create a gully down the filter strip.

Distribution of water over the surface of the pot is essential to develop a uniform root system in the pot. A single column of water such as supplied by a drip emitter in a pot with a pine bark : sand media will not move across the pot but will channel in one spot through the pot, therefore is not suitable. P in P containers are usually irrigated with a 360^0 spray nozzle turned upside-down to cover the surface of the container. Smaller containers up to 15 gallons frequently only have 1 spray stake, while 25 gallon containers and larger usually require at least 2. Most spray nozzles are generally low pressure (15 to 40 psi) and range between 10 to 25 gallons per hour application. Well water or a public water supply usually require only screen filters to remove sediment from the water and prevent plugging nozzles. Pond or surface water requires better filtration. Canister type disk filters may provide adequate filtration for spray nozzles used in P in P. Spray stakes have much larger orifices, compared to drip nozzle orifices which supply water at 1 to 2 gallons per hour in field production. Field drip emitters require expensive sand media filters to avoid plugging.

A 15 gallon container of a pine bark : sand medium will hold approximately 9 gallons of water and a 25 gallon tub will hold approximately 15 gallons of water. This does not mean that you will need to apply 9 or 15 gallons with each irrigation, but you will have to apply what is lost from evaporation and plant transpiration. That amount will change as the plant becomes established and larger. Growers have indicated that as much as 9 gallons per day is required for large well established trees in 15 gallon containers on hot windy days during the growing season. Therefore the term ?low volume irrigation@ may be somewhat misleading. You should plan irrigation per 24 hours to provide as much as 60% of the volume of each container in the P in P nursery and design the irrigation zones based upon the number of containers requiring that much water.

Irrigation zones are designed by matching water sources and pump volumes to the number of nozzles and demand from each nozzle. Irrigation zones are frequently used for laying out growing blocks. For example, if a growing block contained 4 rows with 125 pots per row, (500 pots) and each pot had one 15 gallon per hour spray stake, the pump and water supply must deliver at least 125 gallon per minute (500 pots X 15 gph divided by 60 minutes= 125 gallons/ minute).

Most growers are now burying the irrigation distribution lines. Earlier installations put distribution lines on the surface between two rows of pots. Although this is certainly easiest to do, several problems were encountered. Black poly distribution lines shrink and swell with changes in temperature. Spaghetti tubes to each pot had to be cut long enough to compensate for the shrink swell or they pulled emitters out of the pots when cooler temperatures caused shrinking of the distribution line. Also when black polytube heats up, the water inside heats up

and it is possible to irrigate containers with 130° hot water. To avoid irrigating with hot water, compression ends which leak until pressure comes up in the end of the lines should be installed in the end of distribution lines. This also flushes sediment from the lines and helps reduce plugging of nozzles. Other problems with surface distribution lines is the difficulty they create in moving around the containers, complication in vegetation management if anything but clean culture is employed. Another problem is that sometimes rabbits object to the clutter as they run through the production area so routinely clip the spaghetti tubes.

The alternative to surface distribution lines is to bury distribution lines in the ground along the side of the row of pots. The ends of the distribution lines should be exposed however so that they can be flushed from time to time.. In-ground lines are improve the ability to maintain vegetation around containers if the field is maintained as a bare ground production area.. Where topography is flat, APot in Pot@ nurseries can be maintained as clean culture. Most P in P production in any but the most sandy and flat fields are installing black plastic under ground cloth fabric over the entire production area.

Locating and developing a P in P production area begins with securing an irrigation source. After a water supply is identified, preparation and installation of the P in P growing area becomes very site specific and varies greatly depending upon the topography and preferences of the grower. However, a P in P growing facility, if installed correctly may require only minimal maintenance for several years. Short cuts may initially save money but may reduce the aesthetics of the production facility, increase the effort required to grow crops and reduce plant quality. Initial estimates for installing P in P production facilities range from $17 to $27 per hole. Development of the area should begin with grading the field to optimize surface water movement away from the production area and prevent erosion across the area. Grass filter strips or waterways and possibly even terracing may be required to reduce erosion between growing blocks and or drive roads and around the perimeter of the growing area. On steeper slopes, grass aisles may need to be installed to keep surface water from washing socket pots out of the ground. If covering the area with plastic and ground cloth is intended, level grading of each growing block is necessary. The next step is laying the production area out so that rows and diagonals in each block are straight and that the blocks are aligned. Frequently lines and stakes are used to mark the location of each row and center of each pot. Trenching for placement of corrugated drain lines may follow laying the growing area out. After trenches are dug, drain lines are installed, making sure they will drain to one end of the field. Filter fabric and gravel may be added to prevent sedimentation and filling of perforated drain tile, then the trench may be back-filled to cover the drain line. The next step major task usually is auguring holes for socket pots, installation of drainage between socket pots and drain lines, then placement and setting of socket pots. Socket pots are set at least 3 to 6 inches above grade so that surface water can not enter the pot. Considerable effort may be required to set pots at uniform heights, align and level them. The next task usually is trenching and installation of the irrigation distribution lines. Usually the spaghetti tubes and even nozzles are installed before the distribution lines are placed in the trench and buried. Then the plastic and fabric covering may be stretched over the growing area. Socket pots are located and holes cut over

the area to expose the pots. Irrigation tubes are pulled out from under the plastic and fabric so that they can be placed into growing containers. .

If the P in P nursery is planned, designed and installed correctly, the nursery can be a very environmentally compatible, long lived and profitable nursery production facility.

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TO THE HONORABLE COMMISSIONER OF PATENTS AND TRADEMARKS
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JAY FRALEIGH does hereby declare as follows:

1. I am the inventor of the invention in the above-referenced application.

2. I have worked in the nursery industry for over twenty years, including experience as an irrigation technician, product availability coordinator, general manager specializing in large field grown trees and larger container trees, farm manager overseeing plant production and shipping, and present owner and manager of Fraleigh Nursery, LLC.

3. Unlike conventional in-ground Pot in Pot growing systems, the present invention teaches containers plants in a raised bed. U.S. Pat. No. 6,223,466 to Billings, just like known Pot in Pot systems, fails to suggest how to solve the problem of container flooding during heavy rains where the container plants are placed in in-ground beds and the storm water rises into the container. The present invention teaches the use of raised bed with container plants to avoid container flooding

problems and to control run-off in conjunction with the use of bed coverings and container plants.

4. While U.S. Pat. 5,709,049 to Baird teaches a raised bed growing method, this patent relates only to bare-root plants. Unlike Baird, the present invention relates to container plants. The present invention does not hydrate the plants in the surrounding soil as in Baird. Under Baird's growing method, especially in combination with the Billings '466 patent, a plant in a container could not be hydrated in the bed, such as by drip tape, since the container would resist penetration.

5. Baird's bare-root growing method also relies on retaining walls, such as tires, to create the raised bed. In the container growing method of the present invention, wall-like structures are not required and would result in very significant costs and work to create raised beds for nurseries growing container plants in accordance with invention.

6. In addition, none of the patents cited by Examiner, either alone or in combination, teach or suggest the embodiments of the invention where a temperature control line is provided outside of the container to deliver fluid and moisture in the surrounding bed and also a hydration line for watering the inside of the container plant.

7. I further declare that all statements made herein of my own knowledge, are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both under § 1001 of Title 18 of the United States Code and the such willful, false statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully submitted,

Jay Fraleigh